350
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THE MICROSCOPE

IN

THEORY AND PRACTICE.

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Translated from the German

OF

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WITH NUMEROUS ILLUSTRATIONS.

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PATERNOSTER SQUARE.
1887.

II.

THE STANDS OF MODERN OPTICIANS.

We now proceed to describe a type-model stand that has met with much favour among the leading firms of Continental opticians.

Dr. E. Hartnack, of Potsdam, and A. Prazmowski, of Paris (formerly the firm of Hartnack & Prazmowski, successors to G. Oberhæuser):—The large older *horse-shoe stand* of Oberhæuser (Fig. 51), which these opticians have retained without essential alterations, and which many other opticians have adopted with more or less modifications, has already been referred to as an excellent type-model. It deserves this appellation, because it combines, as no other does, the advantages of the greatest efficiency with simplicity of construction. The coarse adjustment is effected by sliding the tube in the socket, and the fine adjustment by a micrometer-screw, which raises and lowers the socket. The stage revolves, and carries the optical body round with it; it is provided on its under surface with grooves in which the substage slides carrying the condenser or diaphragms; the mirror is movable laterally and vertically, one side being plane, the other concave.

Fig. 51.

Recently these opticians have somewhat altered the construction of this stand, by supplying, amongst other things, rackwork for the coarse adjustment.

[We have thought it preferable to omit any translation of the other parts of this chapter, which are descriptive of stands, as the

matter is dealt with somewhat incompletely, at least according to English views.[1]

[1] In addition to the description of the Oberhæuser Stand—which we have preserved as being the type-model of the authors—the following are described and figured by them :—

OPTICIANS.	STANDS.
Hartnack & Prazmowski ..	Medium horse-shoe.
,, ,, ..	New small (Fig. 52).
,, ,, ..	Students' (Fig. 53).
Nachet & Son (Paris)	Largest (Fig. 54).
,, ,, ...	"Grand Modèle" (Fig. 55).
,, ,, ...	"Grand Modèle, droit" (Figs. 56-7).
,, ,, ...	"Moyen Modèle, inclinant et droit" (Figs. 58-9).
,, ,, ...	"Nouveau Modèle, inclinant" (Fig. 60).
,, ,, ...	"Petit Modèle, inclinant et droit" (Fig. 61).
,, ,, ...	Simple and compound combined (Fig. 62).
,, ,, ...	Stereoscopic binocular (Fig. 63).
,, ,, ...	Double and treble-bodied (Fig. 64).
,, ,, ...	Binocular apparatus, two forms, stereoscopic, and for two observers (Figs. 65-6).
,, ,, ...	Inverted, two forms (Figs. 67-8.)
,, ,, ...	Laboratory dissecting (Fig. 69).
,, ,, ...	Pocket (Figs. 70-1).
,, ,, ...	Horizontal (Fig. 72).
,, ,, ...	Revolving nose-piece or objective-carrier (Fig. 73).
A. Chevalier (Paris)	A general reference to eleven stands.
Plœssl & Co. (Vienna)	Large and small Microscope, described with a reference to a large and small erecting dissecting Microscope, and a travelling Microscope.
F. W. Schieck (Berlin)	No detailed description.
L. Bénèche (Berlin)	
C. Zeiss (Jena)	
E. Leitz (Wetzlar)	
Seibert & Krafft (Wetzlar) ..	Describes in detail their special form of fine adjustment without friction (Figs. 74-6). [See "Journ. R. Micr. Soc." iii. (1880), pp. 883 and 1047.]
G. & S. Merz (Munich)	No detailed description (Fig. 77, three forms).
Smith, Beck, & Beck (London)	Brief description (Fig. 78).

The following are the authors' remarks on the *general* part of the subject:—]

It may not, however, be superfluous, as a supplement to what has been said, if we point out the importance of several points omitted in the introduction, which, according to our experience, deserve special consideration in a critical examination of stands. We place in the first rank of importance *accurate and durable metal-work*. It is by no means a matter of indifference whether the thread of the screws, the focusing arrangements, &c., are of durable construction. On this point we have been able to convince ourselves in the workshop of C. Zeiss, of Jena, how much more exactly the parts of the stand (as, for instance, the pillars and the socket, slides, &c.) may be made and fitted together if the metal is worked by the Fraising machine, instead of being turned or planed.

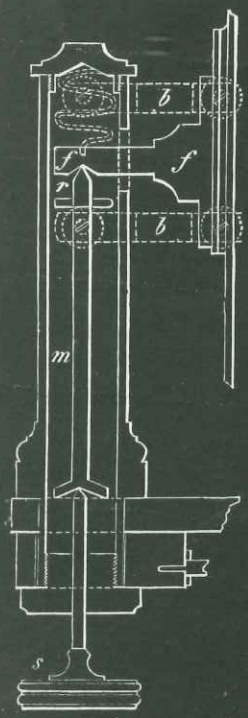

FIG. 79.

Of the special features which a good stand should possess, the chief are:—(1) The solidity of the mechanism of the focal adjustment, which always leaves much to be desired. The shifting of the image, the "back lash" of the screw, &c., are well-known disadvantages almost invariably present in the older stands. On this point also we have met with some important improvements in the workshop of Zeiss; but we must not expect the friction due to the existing modes of construction can be completely eliminated by slight alterations in the construction of the instrument. Whether the fine adjustment devised by Seibert and Krafft will be really durable, time must show. As far, however, as the principle of construction exhibited in Fig. 79 admits of a judgment on the point, friction is reduced nearly to a minimum. The micrometer-screw *s* acts upon the funnel-shaped head of the rod *m*, the upper end of which acts in a similar manner upon *f f*, the solid bar attached to the socket of the body-tube. The ring *r*, which serves as a guide-piece, lies loose in the hollow column, and as a rule does not touch the rod; its function is merely to prevent the point of the rod from slipping out of the notch

in *f f*. If the cross-bars *b b*, which with the tube and column form the movable parallelogram, are of good construction and properly fitted, the focusing movement will presumably be very smooth and free from lateral play.[1] (2) An arrangement of the stage which will, among other things, admit of extremely oblique illumination, is very desirable. For this purpose the aperture of the stage should be bevelled out beneath, otherwise the obliquity of the rays will be limited by the margin. The substage, diaphragms, &c., must be removable, as arranged in many of the larger instruments. With regard to the other appliances which are mentioned in the catalogues, we fail to find, almost without exception, any contrivance which, in investigation with polarized light will allow not only the crossed Nicols, but also the differently-coloured selenite plates to be fixed, and the object alone rotated on a vertical axis.[2] The revolving stage-plate answers this purpose only when the necessary space for the reception of the selenite plates is reserved between it and the fixed stage.

With reference to the adjustment of the mirror, the older arrangements for this purpose are well known. In recent times Nachet, Zeiss, and others have applied a movement forwards, as well as from right to left—an improvement which in certain cases much facilitates oblique illumination.

The stands of German and French opticians have reached such a degree of perfection that they completely satisfy ordinary requirements. For unusual investigations, however—for instance, in physical researches—some additional appliances are sure to be necessary.

[1] The two cross-bars *b b*, on each side, are attached to the column by two screws (shown in dotted lines) permitting pivot motion in the vertical, without lateral play; the socket of the body-tube (joined to *f f*) is held at the front ends of the cross-bars between the *points* of four screws (shown in dotted lines): the friction is therefore confined to the motion of the cross-bars between the eight screws (*i.e.*, four on each side). When the focusing-screw *s* is turned, the solid bar *f f* is pushed upwards, or the spiral spring shown above it presses it downwards, and the cross-bars assume a diagonal position—similar to the motion of an ordinary parallel ruler, of which one side is stationary; *f f* therefore moves slightly backwards, from the normal position figured, carrying with it the optic axis. This motion of the optic axis presents difficulties of centering in combination with a rotating stage.—[Ed.]

[2] This movement is applied to the best English and American stands.—[Ed.]